Spending Your Energy Dollar Wisely

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Spending Your Energy Dollar Wisely

How THRHA is tackling the Energy Hog Problem in our SE Alaska communities
Here is our Problem...

$ High Cost of Energy
$ Cold Maritime Climate
$ Inefficient Homes
$ Lack of Homeowner Education
$ Low incomes, few jobs
$ Not enough $$ to fix the problem

= an Energy Hog Problem
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How we are tackling the Problem:...
(...thanks to grants from DOE Tribal Energy, USDA-RUS, and State)

• Community and Homeowner Education
• Home Energy Assessments and Energy Use Monitoring
• Professional Energy Audits on Multifamily Apartment Buildings
• Develop Energy Conservation Improvement Options
• Weatherization, appliance, heating upgrades
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The Facts.....High Cost of Energy

• **ELECTRICITY** rates up to 275% above the National Average in some villages.

• Small isolated villages are on diesel generator power. Electric Cooperatives. No grids.

• Electric Rates up to $0.68/KwH in diesel-electric communities.

• State subsidy (Power Cost Equalization) for eligible households lowers rate to $0.26/kwh on first 500 Kwh/month.

• Average village household usage is 350 KwH/month.

• Larger towns have hydroelectric generation, micro grids, rates as low as $0.10/KwH
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The Facts.....High Cost of Energy

• **HEATING OIL** costs up to $5.50/gallon in some communities.

• Heating oil is delivered to community by barge from Seattle. No pipelines, no roads.

• No coal, no natural gas.

• Many households cannot afford heating oil....they must heat with wood.

• High incidence of mold in bedrooms in homes heated with wood.

• Many residents in homes heated with wood have asthma symptoms.
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The Facts…..Cold Maritime Climate

- 7000 – 9000 Heating Degree Days
- Over 160 inches/year rainfall. Pacific storms.
- Freeze/thaw cycle weekly
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The Facts.....Lack of Homeowner Education (about Energy Efficiency)

• How to choose most efficient appliances
• How customary habits affects energy usage
• Burn lots of wet wood.
• Little exposure to building science
• Very knowledgeable about subsistence lifestyle
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The Facts.....Inefficient Homes

- High air-leakage
- Poor insulation
- Poor ventilation
- Inefficient heating systems
- Poor maintenance
- Old appliances

= High cost to heat
= Mold in homes
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The Facts.....Low Incomes, Few Jobs

- Subsistence communities
- Almost no commercial economy
- Seasonal jobs
- Local government
- Schools
- Housing Authority
The Facts.....Not enough $$ to fix the Problem

- ENERGY COSTS KEEP GOING UP
- WAGES ARE FLAT OR DROPPING
- GRANTS ARE HARDER TO FIND
Solutions and Successes ......
to tackling the Energy Hog Problem

• Community and Homeowner Education

• Home Energy Assessments and Energy Use Monitoring

ENERGY CENTS PROGRAM

OBJECTIVE: “...provide home energy assessments, energy conservation education, and energy use monitoring for 400 families.”
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ENERGY CENTS PROGRAM

Professional training for 28 local field assessors to conduct home assessments
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ENERGY CENTS PROGRAM

400 Energy Usage Assessments
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Community Meetings and Energy Fairs
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Energy Hog visits with school kids – Angoon, Kake, Hoonah
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Angoon kids play the Light Bulb Game – which one uses more energy?
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Angoon Energy Fair Participants
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With funding from Partners, 1500 Energy Assistance clients receive energy savings kits
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Home Energy Assessment Planning
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Community Awareness and Education plan
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Extended Energy Champion work
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Statement of Project Objectives (sample)

5-e.) Home energy assessment results and recommendations:

<table>
<thead>
<tr>
<th>Region/City</th>
<th>Yes</th>
<th>No</th>
<th>NR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angoon</td>
<td>13</td>
<td>22</td>
<td>7</td>
<td>42</td>
</tr>
<tr>
<td>Hoonah</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>18</td>
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<tr>
<td>Kake</td>
<td>18</td>
<td>36</td>
<td>3</td>
<td>57</td>
</tr>
<tr>
<td>Juneau</td>
<td>14</td>
<td>13</td>
<td>3</td>
<td>30</td>
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<tr>
<td>Other Cities</td>
<td>30</td>
<td>41</td>
<td>7</td>
<td>78</td>
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<tr>
<td><strong>Total</strong></td>
<td>84</td>
<td>119</td>
<td>22</td>
<td>225</td>
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</table>

<table>
<thead>
<tr>
<th>Region/City</th>
<th>Yes</th>
<th>No</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angoon</td>
<td>31%</td>
<td>52%</td>
<td>17%</td>
</tr>
<tr>
<td>Hoonah</td>
<td>50%</td>
<td>39%</td>
<td>11%</td>
</tr>
<tr>
<td>Kake</td>
<td>32%</td>
<td>63%</td>
<td>5%</td>
</tr>
<tr>
<td>Juneau</td>
<td>47%</td>
<td>43%</td>
<td>10%</td>
</tr>
<tr>
<td>Other Cities</td>
<td>38%</td>
<td>53%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37%</td>
<td>53%</td>
<td>10%</td>
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</table>

37 percent of surveyed homes reported at least one resident with asthma or an allergy.
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ENERGY CENTS PROGRAM
Online Homeowner Energy Modeling Tool

Calculate your monthly electric usage and costs with calculator on THRHA website at:

http://regionalhousingauthority.org/housing-programs/southeast-alaska-utility-cost-estimator/

- Can add lines for each appliance.
- Will total consumption up and estimate monthly utility bill.
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Energy Cents Program

RESULTS:
- Good data on close to 400 SE Alaska homes
- Increased homeowner awareness of energy efficiency household energy usage, and how to change habits.
- Increased youth awareness of energy efficiency
- Energy efficient light-bulbs, weather-stripping and watt meters deployed in many homes.

CONCLUSIONS:
- Household education helps save energy.
- Many homes need weatherization.
- Most homes in high-cost diesel-electric communities need renewable energy (non-fossil fuel) heating systems.
Project Description: “The project will provide energy efficiency audits, energy monitoring, and energy conservation proposed upgrades for about 51 low-income, multifamily buildings in 14 southeast Alaska communities with extremely high energy costs.”
Low-income Multifamily Energy Efficiency Building Audits-2014

• 50 + comprehensive EE audits, monitoring, and usage assessments on low-income multifamily buildings in 14 southeast Alaska communities

• Identify cost effective feasible weatherization options for building retrofits that can reduce energy consumption by 30% or more.

• Determine funding for buildings based on feasibility recommendations for energy upgrades /retrofits
Energy Audit

Fireweed Place
Juneau, Alaska

Professional energy audits were conducted on our larger multifamily buildings by energy engineers with experience in complex HVAC systems in multi-story buildings.
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AS-IS Energy Ratings were conducted by trained energy assessors on smaller multifamily buildings using AkWarm energy rating software. Improvement Options Reports were generated showing cost-effective improvements with a Savings to Investment Ratio (SIR) of 1 or better.

Sample AkWarm energy rating on a new building
A typical energy cost comparison chart, for the community of Craig. The cost of locally produced Bio Bricks is less than half the cost per mmBtu than oil.

### Table 2.2-1: Craig Cost of Energy Comparison

<table>
<thead>
<tr>
<th>Technology, Unit</th>
<th>Input Btu/Unit</th>
<th>Cost/Unit</th>
<th>Assumed Efficiency</th>
<th>Output Btu/Unit</th>
<th>Cost/ mmBtu Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Fuel Oil, Gallon</td>
<td>134,000</td>
<td>$4.10</td>
<td>80%</td>
<td>107,200</td>
<td>$38.25</td>
</tr>
<tr>
<td>Electricity, kWh (Resistance)</td>
<td>3,412</td>
<td>$0.23</td>
<td>100%</td>
<td>3,412</td>
<td>$67.41</td>
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<tr>
<td>Electricity, kWh (Heat Pump)</td>
<td>3,412</td>
<td>$0.23</td>
<td>300%</td>
<td>10,236</td>
<td>$22.47</td>
</tr>
<tr>
<td>Wood Pellets, Ton</td>
<td>15,200,000</td>
<td>$330.00</td>
<td>80%</td>
<td>12,160,000</td>
<td>$27.14</td>
</tr>
<tr>
<td>Bio Bricks, Ton (Palletized Unboxed)</td>
<td>15,200,000</td>
<td>$200.00</td>
<td>75%</td>
<td>11,400,000</td>
<td>$17.54</td>
</tr>
<tr>
<td>Bio Bricks, Ton (Palletized Boxed)</td>
<td>15,200,000</td>
<td>$250.00</td>
<td>75%</td>
<td>11,400,000</td>
<td>$21.93</td>
</tr>
<tr>
<td>Seasoned Hemlock, Full Cord</td>
<td>18,100,000</td>
<td>$250.00</td>
<td>70%</td>
<td>12,670,000</td>
<td>$19.73</td>
</tr>
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</table>

Note: Fossil fuel prices provided by AkWarm software based on the 3/30/2015 library. Biomass prices obtained from local providers.
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A sample Cost of Energy Comparison for Ketchikan. Ketchikan is a hydroelectric community. Heat pumps (both air source and ground source) are far less costly per mmBtu output than oil or wood pellets.

<table>
<thead>
<tr>
<th>Technology, Unit</th>
<th>Input Btu/Unit</th>
<th>Cost/Unit</th>
<th>Assumed Efficiency</th>
<th>Output Btu/Unit</th>
<th>Cost/ mmBtu Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Fuel Oil, Gallon</td>
<td>134,000</td>
<td>$4.05</td>
<td>80%</td>
<td>107,200</td>
<td>$37.78</td>
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<tr>
<td>#2 Fuel Oil, Gallon</td>
<td>138,800</td>
<td>$4.05</td>
<td>80%</td>
<td>111,040</td>
<td>$36.47</td>
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<tr>
<td>Electricity, kWh (Resistance)</td>
<td>3,412</td>
<td>$0.11</td>
<td>100%</td>
<td>3,412</td>
<td>$32.24</td>
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<tr>
<td>Electricity, kWh (Air Source Heat Pump)</td>
<td>3,412</td>
<td>$0.11</td>
<td>300%</td>
<td>10,236</td>
<td>$10.75</td>
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<tr>
<td>Electricity, kWh (Ground Source Heat Pump)</td>
<td>3,412</td>
<td>$0.11</td>
<td>500%</td>
<td>17,060</td>
<td>$6.45</td>
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<tr>
<td>Wood Pellets, Ton</td>
<td>15,200,000</td>
<td>$400.00</td>
<td>80%</td>
<td>12,160,000</td>
<td>$32.89</td>
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</table>

*Note: Fuel prices provided by AkWarm software based on the 3/30/2015 library*
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EXAMPLES OF MEASURES THRHA HAS BEEN TAKING TO IMPROVE ENERGY EFFICIENCY AND REDUCE DEPENDENCY ON FOSSIL FUELS:

• Weatherization Program
• Super-insulated building shells (outside insulation)
• Air Source Heat Pumps
• Biomass Heating
• Solar PV
• Improved ventilation systems
• Client education
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Since 2008, THRHA has trained a highly skilled local work force to perform weatherization on homes under the State of Alaska’s Weatherization program, with an average cost per unit of $11,000.

This program has helped many homeowners immensely, yet is not adequate for installing new renewable energy heating systems.
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THRHA Crews have become proficient at building energy-efficient and durable buildings for our climate, with specialized training in cold-climate construction, proper weather-flashing, outside insulation technique, rain-screen siding, airtight construction, and proper ventilation.

THRHA crew lead demonstrates proper window flashing on this house with outside insulation technique.
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THRHA’s newer subdivisions are highly energy efficient and durable construction.

Our new homes are 5 Star Plus energy rated, with non-fossil fuel heating systems and improved ventilation systems for good indoor air quality.
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Our new all-electric Saxman Senior Center is a state-of-the-art building with outside insulation technique and air-source heat pumps. It requires less than 5 BTU/square foot to heat.

This is a hydro-electric community at $0.10/kWh rates.
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The new energy efficient THRHA warehouse in Juneau is heated with a wood pellet boiler. It is clean burning, quiet and as maintenance free as any equipment we have used. It has a 10-ton silo. We do not have to worry about any fuel spills. It is saving us about $9,000/year over oil on heating costs.
The newly modernized Kake Senior Center is highly energy-efficient, and is heated with a wood pellet boiler. Based on our energy audits, we also installed a 9KW solar PV system to help displace some of the high cost ($0.65/kWh) electric rates.
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In some of our hydroelectric communities we are replacing electric resistance heat and oil heat with new “mini-split” ductless air-to-air heat pumps. With efficiencies to 300%, ranges down to -15 F, and installed costs of less than $5,000, they are becoming a hot item in hydroelectric communities.
FINAL OUTCOMES provided energy data, improvement options, and cost-effective recommendations for making our multifamily building in SE Alaska more energy efficient, our communities more sustainable.
Thank you for what you offered for my hometown of Wrangell!! All the clients are happy by what we taught them and what we all learned- Byron Cady and Sue Stevens, EC Crew

I never use too much heat, I never leave my lights on, but I will get rid of that damn toaster- Helen Adams, Hydaburg resident
Testimonials

• You helped me save energy and money, which will help my children learn how to conserve energy—Michelle Mingmins-EC client

• It teaches kids how important it is to be conscious of what is going on in the home, and I am able to pay my energy bill on time instead of being behind!—Lorena Cano EC client
• I learn little things matter. Lights matter, my home is not wasteful, but small things make a difference, I’m saving much more than before! - Harold Frank-EC client

• You are a blessing, thank you for your time. I save money now on my energy, I can afford to do more, I am happier. Henrich Kadake-EC client
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https://www.youtube.com/watch?feature=player_embedded&v=h4cqyEHeeA
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Gunalchéesh!
Haw’aa!

Regional Housing Authority